



PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Docket No: Q67642

Minoru Teshima and Toru Tabuchi

Appln. No.: 10/022,362

Group Art Unit: 1745

Confirmation No.: 3575

Examiner: DOVE, TRACY MAE

Filed: December 20, 2001

For: NON-AQUEOUS ELECTROLYTE SECONDARY BATTERY

DECLARATION UNDER 37 C.F.R. § 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Minoru TESHIMA hereby declare and state:

THAT I am a citizen of Japan;

THAT I have received the degree of Master in department of energy and hydrocarbon chemistry
from Kyoto University;

THAT I had worked for Japan Storage Battery Co., Ltd. since 1998;

I have worked for SANYO GS Soft Energy Co., Ltd. since 2003, where I have researched and
developed lithium ion batteries;

I am an inventor of the above-identified application;

In order to demonstrate the unexpected superiority achieved by the present invention the
following experimentation was carried out under my supervision and control;

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In the section of "Response to arguments" in the Office Action dated September 3, 2004, the Examiner stated: "Unexpected results must distinguish the claimed invention over the prior art. Comparative Example No.13 is not representative of the Suzuki reference. Suzuki teaches a solvent mixture comprising phenylethylene carbonate, ethylene carbonate and diethyl carbonate(chain carbonate). The phenylethylene carbonate is added to a 50:50 vol% mixture of ethylene carbonate and diethylcarbonate(0024). Thus, at least this embodiment of Suzuki does not require propylene carbonate(PC), methyl ethyl carbonate(MEC) or dimethyl carbonate(DMC) that are required by Comparative Example No.13."

In order to establish the unexpected and unobvious differences of the present invention over the Suzuki reference, the following experiments were carried out by me or under my direct supervision.

Experimentation

Working electrodes(the negative electrodes of lithium ion battery) were prepared by coating the mixture of graphite powder and binder on copper current collector sheet, drying and pressing it. Metallic lithium was used as counter electrodes and reference electrodes. The negative electrodes were charged at $0.5\text{mA}/\text{cm}^2$ to 0.0V vs. Li/Li^+ at 25°C and discharged at $0.5\text{mA}/\text{cm}^2$ to 1.5V vs. Li/Li^+ at 25°C in beaker cells with several kinds of electrolyte solutions.

The results of the experimentation are shown below. The each value in the table is average one of two samples.

Table Results of initial charge and discharge of the negative electrodes

	Electrolyte solution	Amount of electricity of charge / mAh/g	Discharge capacity / mAh/g	Initial irreversible capacity / mAh/g
Comparative Example A	1M LiClO ₄ in EC+DEC(50:50 by vol.)	326	303	23
Comparative Example B	1M LiClO ₄ in EC+DEC(50:50 by vol.) + phenyl ethylene carbonate 2wt%	333	312	21
Comparative Example C	1M LiClO ₄ in EC+PC+DEC(20:20:60 by vol.)	355	304	52
Example D	1M LiClO ₄ in EC+PC+DEC(20:20:60 by vol.) + phenyl ethylene carbonate 2wt%	324	303	21

From the results above, it is apparent that only in the case that PC is used the effect by phenyl ethylene carbonate is obtained. The comparison between Comparative Examples A and B shows that in the case that PC is not used the initial irreversible capacity is scarcely decreased by addition of phenyl ethylene carbonate. On the other hand, the comparison between Comparative Example C and Example D shows that in the case PC is used the initial irreversible capacity is remarkably decreased by addition of phenyl ethylene carbonate. Therefore, the effect by the present invention of claim 1 is unexpected and unobvious over the Suzuki reference(EC+DEC

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50:50 + phenyl ethylene carbonate) not containing PC. Thus, it is believed that the burden to establish results that are unexpected and significant over the prior art was satisfied and thus the present application should be allowed.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 25 / 11 / 2004

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